

US ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SPK-15175
Apr 89

TO: Architect-Engineers and District Personnel:

1. This is Sacramento District Instruction to SPK-15175, POL STORAGE IN UNDERGROUND TANKS, dated April 1989.
2. The attached revised guide specification supercedes the previous guide, SPK-15C, dated January 1986, and is for use in the preparation of project specifications.

NOTE: A-E's should read all the TECHNICAL NOTES located at the beginning of this guide specification and edit the specification accordingly.

SPK-15175

Apr 1989

GENERAL NOTES

1. This guide specification is to be used in the preparation of contract specifications in accordance with the Sacramento District Specification Manual. It will not be made a part of a contract merely by reference; pertinent portions will be copied verbatim into the contract documents.
2. Where numbers, symbols, words, phrases, clauses, or sentences in this specification are enclosed in the following manner: [], a choice or modification must be made; delete inapplicable portion(s) carefully. Where blank spaces occur in sentences, insert the appropriate data. Where entire paragraphs are not applicable, they should be deleted completely.

TECHNICAL NOTES

- A. This specification was intended to be used for underground storage tanks for hazardous substances in Military installations located in California. However, per messages from DAEN-ECE-E, DAEN-ECE-G (dated 12/02/85) and AFRCE-WR-WROE (dated 12/28/84), this specification will also be used in the states of Arizona, Nevada and Utah in which POL will be stored in underground tanks. Note the title change to "POL STORAGE IN UNDERGROUND TANKS".
- B. The section number will be inserted in the specification heading and prefixed to each page number in project specifications.
- C. Paragraph 1: The listed designations for publications are those that were in effect when this guide specification was being prepared. These designations are updated when necessary by District Instruction, and references in project specifications need be no later than in the current District Instruction for this guide specification. To minimize the possibility of error, the letter suffixes, amendments, and dates indicating specific issues should be retained in Paragraph 1 and omitted elsewhere in the project specification.
- D. Paragraphs 2.1, 2.3, 5.8, 5.12.1, 9.2 and 10.3: The use of double-wall or single-wall piping shall be in accordance with local or state ordinance on underground storage of hazardous substances. Designer shall furnish a copy of such ordinance to Sacramento District, DQA

Section for review.

15175-i

SPK-15175
Apr 1989

INDEX

SECTION 15175

POL STORAGE IN UNDERGROUND TANKS

Paragraph	Page
1. APPLICABLE PUBLICATIONS	15175-1
2. GENERAL REQUIREMENTS	15175-2
3. SUBMITTALS	15175-3
4. DELIVERY AND STORAGE	15175-4
5. MATERIALS AND EQUIPMENT	15175-4
6. OVERFILL PROTECTION	15175-10
7. PIPING SYSTEMS	15175-11
8. VAULTED TANKS	15175-11
9. INSTALLATION	15175-12
10. INSTALLING FITTINGS	15175-13
11. CATHODIC PROTECTION TEST	15175-14
12. CONSTRUCTION QUALITY CONTROL	15175-14

SECTION 15175

POL STORAGE IN UNDERGROUND TANKS

1. APPLICABLE PUBLICATIONS: The publications listed below, form a part of this specification to the extent referenced. The publications are referred to in the text by basic designations only.

1.1 Military Specifications (Mil. Spec.):

MIL-Y-1140H & Am-1	Yarn, Cord, Sleeving, Cloth, and Tape-Glass.
MIL-R-7575C & Am-2	Resin, Polyester, Low-Pressure Laminating.

1.2 American National Standards Institute, Inc. (ANSI) Standards:

B1.20.1-1983	Pipe Threads, General.
B16.1-1975	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 & 800.
B16.3-1977	Malleable Iron Threaded Fittings, Class 150 and 300.
B16.4-1977	Cast Iron Threaded Fittings, 125 and 250 lb.
B16.5-1981	Pipe Flanges and Flanged Fittings.
B31.1-1986	Power Piping.

1.3 American Society of Mechanical Engineers (ASME):

Boiler and Pressure Vessel Codes, and Interpretations:

Section IX	Welding and Brazing Qualifications, 1986, (and Addenda: Winter 1986.
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1.4 American Society for Testing and Materials (ASTM) Publications:

A 53-87a	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
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A 120-84 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

A 366-85 Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

A 516-86 Pressure Vessel Plates, Carbon Steel for
Moderate and Lower Temperature Service.

A 2996-88 Filament-Wound Reinforced Thermosetting
Resin Pipe.

1.5 American Welding Society, Inc. (AWS) Standard:

D1.1-86 Structural Welding Code-Steel.

1.6 National Fire Protection Associates (NFPA):

NFPA 30-1986 Flammable and Combustible Code.

1.7 Steel Structures Painting Council (SSPC) Specifications:

SSPC-SP 6-85 Commercial Blast Cleaning.

SSPC-SP 8-82 Pickling.

SSPC-SP-10-85 Near-White Blast Cleaning.

SSPC-Paint 16-82 Coal Tar Epoxy-Polyamide Black (or Dark
Red) Paint.

1.8 Underwriters Laboratories Inc. (UL) Standards:

UL 58 Tank, Steel, Underground for Flammable and
Combustible Liquids. (April 15, 1986,
8th Ed.).

UL 1316 Glass-Fiber-Reinforced Plastic Underground
Tank for Petroleum Products.
(March 3, 1987).

2. GENERAL REQUIREMENTS: The drawings indicate the extent and arrangement of the tank and its associated piping. If any departures from the contract drawings or the provisions of this section of the specification are deemed necessary by the Contractor, details of and reasons therefore shall be submitted as soon as practicable to the Contracting Officer for consideration. No such departures shall be made without prior written approval of the Contracting Officer.

2.1 Standard Products: Underground double-wall POL storage tanks shall be

the products of a single manufacturer. The [double-wall] [single-wall] piping system and leak detection system for tank and piping may be the products of separate manufacturers.

2.2 Permits to Operate: The Contractor shall provide required permits to construct and operate underground storage tank per local agency regulations, and pay costs as required. Permits shall be posted under glass.

2.3 Certificate of Tests: As soon as practicable and within 30 days after award of the contract and before any underground double-wall tank and [double-wall] [single-wall] piping are purchased, the Contractor shall submit certificates stating that the tank and piping to be furnished will be manufactured by firms which regularly produce such materials in accordance with NFPA and UL Standards and State of California Health and Safety Codes.

2.4 Welding: [Piping shall be welded in accordance with qualified procedures using performance-qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME Section IX.] Welding procedures qualified by others, and welders and welding operators qualified by another employer may be accepted as permitted by ANSI B31.1. Contracting Officer shall be notified 24 hours in advance of tests and the tests shall be performed at the work site if practical. The Contracting Officer shall be furnished with a copy of qualified procedures and a list of names and identification symbols of qualified welders and welding operators.

2.5 Name Plates: Each major component of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment. Name plates shall be provided for:

- Double wall POL tanks
- Pumps
- Cathodic protection equipment
- Double wall pipes
- Leak detection and monitoring system

2.6 Verification of Dimensions: The drawings show the extent and general arrangement of the underground POL storage tank system. The Contractor shall become thoroughly familiar with all details of the work and working conditions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work. The Contractor shall be specifically responsible for the coordination and proper relation of the work to underground tank and to the work of all trades.

3. SUBMITTALS:

3.1 Shop Drawings: Shop drawings shall be submitted in accordance with the SPECIAL CLAUSES, and shall consist of a complete list of equipment and

materials, including manufacturer's descriptive and technical literature; performance charts and curves; catalog cuts; and installation instructions. Shop drawings shall also contain complete wiring and schematic diagrams; and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

3.2 Spare Parts Data: The Contractor shall furnish data for each different item of materials and equipment specified, in accordance with the SPECIAL CLAUSES. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

3.3 Operating and Maintenance Instructions:

3.3.1 Operating instructions outlining the step-by-step procedures required for system start-up and operations shall be furnished in accordance with the SPECIAL CLAUSES. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features.

3.3.2 Maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs shall be furnished. The instructions shall include simplified piping diagrams for the system as installed.

3.4 Performance Test Reports: Upon completion and testing of the installed system, tests reports shall be submitted in booklet form showing all field tests performed to adjust each component and all field tests performed to provide compliance with the specified performance criteria. Each test report shall indicate the final position of controls.

4. DELIVERY AND STORAGE: All equipment placed in storage shall be stored with protection from weather, humidity and temperature variations, dirt and dust, or other contaminants.

PART 2 - PRODUCTS

5. MATERIALS AND EQUIPMENT: Materials and equipment shall conform to the respective publications and other requirements specified herein.

5.1 POL tank shall be double-wall type construction of mild steel plate or glass fiber reinforced polyester resin (FRP Tank).

5.2 Tank shall be fabricated and tested in accordance with Underwriters' Laboratories and NFPA standards. A 12" x 12" x 1/4" thick steel plate shall be provided at the bottom of the inner tank beneath the gage stick opening or pump-out line for protection against puncture. Tank shall be UL listed.

5.3 Construction shall be double-wall type in accordance with the State Health and Safety regulations for underground storage of hazardous substances. Provision shall be made for detecting leaks in both tanks.

5.4 Plans show a cathodically protected steel tank with steel piping. When a fiberglass reinforced polyester resin tank, a fiberglass clad steel tank, or

F RTP piping is proposed, new installation drawings specific to the job shall be submitted for approval showing the following data:

- modifications to the cathodic protection system
- location and number of insulating unions
- tie down system
- installation of leak detection system in tank
- changes in tank venting

5.5 Steel plate tank shall be all welded tank. Tank shall be coated and cathodically protected as specified hereinafter.

5.5.1 Steel Tanks: Double-wall tanks shall be suitable for underground installation and shall be constructed and labeled in accordance with NFPA No. 30. Tanks shall be secured to concrete cradles sized and designed to prevent flotation of empty tank when ground is saturated with water. Tanks shall have connections for fill pipe, gage pipe, vent pipe, and oil supply and return lines. Each tank shall have a manhole opening not less than 24 inches in diameter and a matching watertight steel cover. Access to the interior of tanks shall be provided by extending the manhole opening as indicated and covered with matching watertight steel cover. Wall thickness of manhole extension shall not be less than the tank shell. Steel tank anchoring straps shall be electrically insulated.

5.5.1.1 Protective coating for underground storage tanks, manhole extension, and covers shall be applied in the shop or in the field. The exterior surfaces of the tank to be shop coated shall be prepared by blasting or pickling. Surfaces of the tank to be field coated shall be prepared by field blasting. Blasting and pickling shall conform to SSPC-SP 10 and SSPC-SP 8, respectively. Prepared surfaces shall be primed as soon as practicable, but in any event prior to any formation of corrosion. In the coating system, products of a single manufacturer shall be used, and shall be one of the following at the option of the Contractor.

5.5.1.1.1 Coal tar-epoxy paint shall conform to SSPC-Paint 16.

5.5.1.1.2 Coal tar primer and epoxy paint shall be applied in accordance with SSPC-SP 10.01-Paint 16.

5.5.1.2 Glass Fiber Reinforced Polyester Coated Tank: Exterior coating of outer tank shall be shop applied using glass fiber conforming to Mil. Spec. MIL-Y-1140 and corrosion resisting grade polyester resins meeting the grade B (superior) requirements of Mil. Spec. MIL-R-7575 for physical strength. The exterior of the steel tanks shall be prepared by removing all weld spatter and

rough or sharp edges by chipping or grinding. Surfaces and joints shall be sandblasted to "near white metal" in accordance with SSPC-SP 10 and cleaned of all dust by vacuuming or air brushing. After cleaning, surfaces shall be kept free of fingerprints and other contamination. Local surface cleaning may be accomplished using clean, lint-free cloth and industry approved liquid

detergent. Coating shall not be applied if either the steel tank or the ambient temperature is below 60 degrees F. Sprayed resin material shall be heated to 90 degrees F. prior to and during the spraying operation. Catalyst concentration shall be varied to compensate for variation in humidity and temperature. A thin coat of resin-catalyst mixture shall first be applied to the area being worked then followed by the full thickness application of chopped glass fiber-resin catalyst. After application, the coating shall be rolled with special slotted rollers in full motion with overlapping passes along entire tank, to remove all air bubbles and pack all loose strand ends. A seal coat of resin-catalyst mixture, without chopped fiber, shall then be applied to entire tank surface. The final thickness shall be not less than 1/8 inch at any point.

5.5.1.3 Coating shall be examined for flaws; tested for holidays; and its thickness shall be measured as a Contractor Quality Control requirement. The Contractor shall provide the facilities, personnel, and equipment for testing for holidays and measuring thickness. Thickness of coating shall be measured by commercial film-thickness gage. Directly prior to placement, coating shall be tested with an electric flaw detector, equipped with a bell, buzzer, or other type of audible signal that operates when a holiday, pinhole, or other defect is detected. The holiday test shall be performed at dielectric resistance of 35,000 volts or that voltage which is specified (in writing) by the manufacturer. A Tinker and Razor model AP-W Holiday Detector or equivalent at 35,000 volts is acceptable. Check of the holiday detector potential may be made by the Contracting Officer at any time to determine the suitability of the detector. Damaged areas, including areas damaged by thickness testing, shall be repaired with materials identical to those used originally and after drying, shall be retested electrically as previously specified. Record of test and test report shall be submitted to the Contracting Officer together with the Construction Quality Control daily report.

5.6 Glass Fiber Reinforced Plastic (FRP) POL Tanks: Each double-wall tank shall conform to the requirements of UL and NFPA Codes and Standards. In addition, it shall meet the following criteria:

a. External hydrostatic pressure: When buried in the ground, the tank shall be capable of withstanding three feet of water over the top of the tank with a 3:1 safety factor.

b. Surface Loads: When installed according to manufacturer's installation instructions, tank shall be capable of withstanding H-20 axle loads.

c. Internal Load: Tank shall withstand 5 psi pressure test with a 5 to

1 safety factor.

5.6.1 Installation: Prior to installation, tank shall be tested above ground at 5 psi pressure and fittings shall be soaped and checked for leaks.

a. Hole size shall be large enough to allow a minimum of 12 inches from ends and sides of tanks to hole walls. The tank hole shall be deep enough to allow a minimum of 6 inches backfill bed over the hole bottom. [Tanks subjected to traffic shall have a cover depth of 3 feet backfill, or 18 inch minimum backfill plus 6 inches reinforced concrete.] [Tanks not subjected to traffic loads shall have a minimum cover of 2 feet backfill, or one foot backfill plus 4 inches reinforced concrete.] [Reinforced concrete paving must extend at least one foot beyond tank outline in all directions.] [Depth of cover shall not exceed 7 feet over tank top.]

b. Backfill material shall be placed to top of tank in 12-inch layers to insure that material fills in under tank and end caps. Product shall not be added to tank before backfill is to top of tank.

c. Backfill material shall be naturally rounded aggregate, clean and free flowing with particle size not less than 1/8-inch or more than 3/4-inch in diameter.

d. Glass Fiber Reinforced Plastic (FRP) tanks must not be placed directly on concrete slabs, beams or cradles. Anti-lifting components as recommended by the manufacturer shall be provided.

5.6.2 Pipe and fittings for glass fiber reinforced plastic POL storage tank shall conform to the requirements of ASTM D 2996.

5.7 Storing, Handling, and Placing of Coated Tanks: Procedures shall be executed with care and in a manner that will minimize damage to the coating and will not reduce its effective protective value. Coated tanks shall be placed in position carefully and with a minimum of handling. Damaged surfaces shall be cleaned of rust and dirt, if any, and coating reapplied to match adjacent surfaces by and at the expense of the Contractor. Backfill shall not be started until the in-place tank has been inspected and certified by the Contracting Officer to be ready for backfilling specified in SECTION: EXCAVATION, FILLING, AND BACKFILLING FOR BUILDINGS.

5.8 POL Piping: [Single-wall] [Double-wall] piping is required between the oil storage tanks, and pipe risers in equipment room. Above ground piping requires only single-wall pipes. Pumps shall be furnished complete with valves, strainers, traps, insulation, and accessories. A check valve shall be provided on the suction line to each tank. Fill line shall be in the opposite end of the tank from the suction and oil return lines. Fill and oil return

lines shall be extended to within one pipe diameter of the bottom of the tank, and the lower end of the suction line shall not be more than 6 inches from the bottom of the tank or as indicated. Each tank suction line shall be provided with a gate valve. Steel piping installed underground shall be thoroughly cleaned of foreign matter by wire brushing and solvent cleaning before field application of coating. Piping shall be coated as specified for tanks or

shall be field prime coated and immediately wrapped with plastic tape applied with a 50 percent overlap. Prior to installing tape, the piping shall be tested and the joints and fittings shall be coated with material identical to that used on the pipe. Steel pipe shall be cathodically protected. FRTP pipe may be used for buried lines if allowed by local authority.

5.9 Oil-Tank Gage: Gage shall be provided for each oil storage tank. Gage shall be remote-reading oil-tank indicating device of standard manufacture, complete with all piping, valves, fittings, and accessories. Gage dial shall be graduated in 50-gallon increments and located as indicated. All parts of the gage within the tank shall be of ferrous metal.

5.10 Leak Detection System: Leak detection system shall indicate by an audible alarm and indicator lights the occurrence of a leak in any part of either tank shell. The system shall be the electronic float type as manufactured by Mallory/Emhart or the liquid filled type as manufactured by Owens Corning, or other type of detector as approved for use in California. For monitoring backfill area, acceptable devices include gas detectors, observation wells, and thermal conductivity sensors.

5.10.1 Leak detection system shall be UL listed for use with hydrocarbon fuels. All system components except the alarm panel shall be intrinsically safe for Class 1, Division 1, Group D.

5.10.2 Complete product and installation data shall be submitted for approval. All sensors, liquids, cables, conduits, piping, hangers, control and alarm panels, accessories and appurtenances required for a complete installation per manufacturer's recommendations shall be provided.

5.10.3 Observation wells shall be provided [in areas of seasonal high groundwater] where the tank is anchored in the groundwater during normal operation. They may employ any of the types of leak detectors previously discussed to provide continuous monitoring.

(1) Observation wells shall consist of a 4-inch diameter (Schedule 40) PVC pipe driven into the tank excavation. Well screens shall be provided and have a slot size of 0.02 inches, and shall be extended to grade and covered with a waterproof cap which is capable of being sealed.

(2) All observation wells shall be obviously identified, including the military installation name, well number, type of installation or device installed, and key construction data such as depth, hole and casing diameters, and location of screened or perforated intervals. All observation well caps shall be provided with locking means with access availability to the

installation.

5.10.4 POL tank shall be monitored by the leak detection system.

5.11 Tank Accessories: Tappings of sufficient number and proper size to accommodate all connections shall be provided in tank. Tanks for fuel oil

shall have the accessories shown on the plans conforming to the requirements listed below:

- a. FILL BOX AND COVER.
- b. FILL CAP.
- c. VENT CAPS.
- d. EXTRACTOR ASSEMBLY.
- e. HARDWOOD MEASURING STICK.--Marked in one-eighth inch intervals; and calibrated with tank calibration.
- f. COVER WRENCH.--Suitable for removing access covers and fill cap.
- g. WASTE OIL TANK PUMP OUT BOX, COVER, FILL CAP.--Same as a. above. Cover shall be permanently marked "waste oil".
- h. RECTANGULAR OR ROUND MANHOLE AND COVER.--Traffic duty, ductile iron cover without hinges, with gasket seal and bolted lid. Unobstructed opening 12" x 18", or 18 inch diameter.
- i. TANK INTERIOR LADDER shall be steel or aluminum and shall be provided as indicated. (Normally 4' in diameter and larger.)

5.12 Piping Material: Pipe shall be Schedule 40 black steel pipe; ASTM A 120, or A 53 with 150 pound malleable iron banded screwed fittings and steel couplings. FRTP piping may be used for buried lines if allowed by local authority.

5.12.1 Pipe Wrapping Tape: [Double-wall] [Single-wall] piping wrapping tapes for steel pipe buried in ground shall be pressure sensitive polyvinyl chloride or polyethylene tape having nominal thickness of 20 mils: Manville "Trantex VID-20"; Scotch rap 5D, Polyken 92, or equal. Primers shall be Manville Adhesive #22 Scotch rap Pipe Primer, or equal. If exterior pipe wall is of reinforced fiberglass plastic material, then no wrapping or coating is required. However, all exterior pipe shall be pressure tested to 5 psig without any leaks being evident.

5.12.2 Unions: Unions for steel pipe shall be 250-pound, threaded malleable Iron, ANSI B 16.3, ground joint, brass to iron seat, black to match piping.

5.12.3 Insulating Unions: Insulating unions at locations specified or shown

on the plans shall be insulating flange, or unions, as applicable; F. H. Maloney, Walter C. Vallett, Service Engineers, Central Plastics, Corro-Ban Products, Epco, constructed so that the dissimilar pipes being connected are completely insulated from each other with no metal to metal contact, and suitable for service on which used. Insulating couplings shall not be used.

6. OVERFILL PROTECTION:

- a. An appropriate overfill prevention system will be required unless it can be demonstrated that an equivalent degree of protection exists within the proposed underground storage facility.
- b. An appropriate overfill protection device shall be a device that prevents continual spillage from occurring as a result filling operations. This device shall also preclude the contract of any temporarily held product with any potential ignition source. All proposed overfill protection devices are subject to approval by the Contracting Officer.

6.1 Overfill Prevention System Devices:

6.1.1 Level Sensing Devices

- a. Tape float Gauge - The device shall provide a local (above the tank) readout of both gasoline and water levels while prohibiting vapor loss, and interface with electronic or pneumatic controls for the purpose of alarm and shut-off response.
- b. Float Vent Valves - Float vent valves are devices used to prevent overfilling of underground POL tanks. When installed in the tank's vent line, the float shall close the vent line when high liquid level is attained, thus blocking the escape of air. This action shall cause the pressure inside the storage tank to equalize with the discharge head in the tank truck, thereby interrupting the flow of liquid.
- c. Capacitance Sensors - These devices shall operate based on the electrical conductivity of fluids used to monitor liquid level. These devices shall consist of a rod as one electrode and the other electrode being the metallic tank wall. The electrical capacitance between the electrodes shall measure the height of interface along the rod electrode. The rod shall be electrically insulated from the liquid in the tank by a coating of plastic.

6.1.2 High Level Alarms:

Overfill alarms shall be visual or audible instruments which are remotely mounted. However, when several tanks are being monitored in the same control room, individual warning lights shall be provided for each tank. All alarms shall be mounted as directed by the Contracting Officer.

6.1.3 Automatic Shut-Off Controls:

Automatic shut-off control systems shall interface with level sensing devices to: 1) prevent tank overfilling by shutting off the tank loading pump at a preset high level; 2) prevent damage to the tank unloading pump by

shutting it off at low level; or 3) operate various flow valves to control product flow. These control systems shall receive a signal from the level sensing device which is transmitted electrically or pneumatically to the control system. Pneumatic devices shall be provided with a regulated supply of clean and dry instrument air, generally at 20 pounds per square inch (psi). Electric (or electronic) devices which require 115V line voltage.

7. PIPING SYSTEMS:

7.1 Contract Clauses:

The design, fabrication, assembly and testing of piping systems to contain flammable and combustible liquids shall be in conformance with the applicable sections of ANSI B31, (American National Standard Code) for Pressure Piping and NFPA 30, Flammable and Combustible Liquids Code.

All piping systems connected to underground storage facilities shall provide for leak detection and continuous monitoring.

7.2 Testing Sequence to be Performed by Contractor:

- Isolate the piping system at both ends.
- Soap all joints.
- Gradually pressurize to 150% of working pressure or at least 50 psi. The gauge used shall have a full scale reading of no more than twice the test pressure (e.g., if the test pressure is 50 psi, the gauge shall be no more than 100 psi full scale).
- Inspect for bubble formation; monitor for pressure drop for one-half hour.
- No tightening or repairs shall be attempted while the system is pressurized.
- Wrap or coat joints in preparation for backfilling operations.

8. VAULTED TANKS: Due to the complexity of vault installations and the risks inherent in a system which allows the leaked hazardous material travel time before detection, the vault method is to be used only in those situations in which the intent of the law cannot be met in more reliable ways such as described previously.

8.1 The vaulted area must be sufficient in volume to enable visual inspection of the tank on all sides including the bottom, and any piping and joint connections. The monitoring (visual inspection) must be performed at time intervals specified by the County Environmental Health Services in which the tanks are located.

8.2 The vault as a unit must be proven to be product tight and capable of remaining product tight throughout the anticipated service life of the facility.

8.3 The concrete vaulted area will require a reinforcement bar system that assures the vault as a unit will be stable in times of soil movement or seismic activity. Seismic stability must be certified on the plans by a California licensed structural or civil engineer experienced in this area.

8.4 Because a spill in such a vault would create a serious fire hazard, all such vaults must meet local Fire Department Criteria specific to the vault system, a county permission to construct vaulted tank must be obtained before starting excavation.

8.5 Excavation practices must meet the requirements of the County Building Department and of the State's Occupational Safety and Health Administration. In addition, it shall meet the requirements of SECTION: CONCRETE.

8.6 Cathodic protection shall conform to requirements under SECTION: CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODES).

PART 3 - EXECUTION

9. INSTALLATION: Tank and piping shall be installed in accordance with NFPA standards, the provisions of the State Health and Safety Code, and the manufacturer's recommendations. Fill and suction lines shall be extended to bottom of tanks by means of double tapped bushings. Suction, return, and vent pipes shall be graded down toward tanks not less than 1/4-inch per foot without loops or traps. Insulating unions shall be provided from tanks, above ground.

9.1 Tank shall be visually inspected for damage at delivery, just prior to installation and prior to backfilling.

9.2 Leak Detection System: A leak detection system shall be installed in accordance with manufacturer's recommendations. The extractor, fill and recovery pipes and boxes shall be wrapped in accordance with para 10.3, Wrapping and Coating Steel Pipe for [Double-Wall] [Single-Wall] Pipe, hereinafter.

9.3 Testing: A general performance test to demonstrate the proper operation of the tank and piping shall be made by the Contractor and in the presence of the Contracting Officer or his representative. Tank shall be isolated from piping when pressure testing piping.

9.3.1 The tank shall be pressure tested with air per manufacturer's recommendations and proved tight before and after backfilling.

9.3.2 The leak detection system shall be tested by a representative of the

manufacturer and witnessed by the Contracting Officer. The tests shall consist of a visual inspection and an electronic test with results submitted to the Contracting Officer.

10. INSTALLING FITTINGS:

10.1 Unions shall be installed where shown and at each threaded or soldered connection to equipment, tanks and valves (on downstream side). Locate unions so piping can be easily disconnected for removal of equipment, tank or valve. Omit unions at compression stops.

10.2 Insulation Union Locations: Insulation unions shall be provided where shown and at the following locations:

- a. At each end of buried ferrous line protected with sacrificial anode, except as otherwise shown.
- b. At connections to fuel pumps.
- c. At fuel and oil waste vent lines.

10.3 Wrapping and Coating Steel Pipe for [Double-Wall] [Single-Wall Pipe]: Steel pipe buried in ground shall be wrapped or coated.

- a. Wrapped steel pipe shall be wrapped with pressure sensitive polyvinyl chloride or polyethylene tape having nominal thickness of 20 mils. Pipe shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
- b. Tapes shall be tightly applied with 1/2-inch minimum uniform lap, free from wrinkles and voids with approved wrapping machines and experienced operators to provide not less than 20 mil thickness.
- c. Plastic coating on steel pipe shall be factory applied. Field joints, fittings, and valves for coated steel pipes shall be wrapped to provide continuous protection. Coating imperfections and damage shall be repaired to the satisfaction of the Contracting Officer.
- d. Field joints and fittings shall be covered by wrapping polyethylene or polyvinyl tape specified for wrapping pipe, except 2 layers or 10 mil thick tape shall be used. Wrapping at joints shall extend a minimum of 6 inches over adjacent pipe coverings. Width of tape for wrapping fittings shall not exceed 2 inches. Adequate tension shall be applied so tape will conform closely to contours of fittings. Putty tape insulation compounds approved by the Contracting Officer shall be used to fill voids and provide smooth even surfaces for application of tape wrap.
- e. Fuel system piping using RTRP piping and steel fittings shall have

the fittings wrapped with 30 mils of wrapping.

11. CATHODIC PROTECTION TEST:

11.1 General: Cathodic protection tests and measurements shall be provided for tank and piping as shown on the plans and in accordance with the requirements in SECTION: CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE).

12. CONSTRUCTION QUALITY CONTROL: Attention is directed to SECTION: CONSTRUCTION QUALITY CONTROL which requires the Contractor to perform quality control inspection, testing, and reporting.

* * * * *

- REMINDER -

Located at the front of these specifications are the Contract Clauses, Special Clauses and Division I GENERAL REQUIREMENTS of the Technical Specifications, which apply to every aspect of this contract including the work in this section whether performed by Prime Contractor, subcontractor, or supplier.